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VETERINARY JOURNAL

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Editorials.

THE PREFIX "ROYAL" TO THE BRITISH VETERINARY CORPS.

THE honour done by His Majesty the King in allowing the prefix "Royal" to be applied to the name of the Army Veterinary Corps is much appreciated. It is an honour to our profession and an acknowledgment of good work honourably done.

To realise its importance fully one needs to be in uniform, and those who are or who have been serving during this war have already realised its value. For other corps to be designated "Royal" and the A.V.C. to be left out was an invidious distinction which almost amounted to a reproach, and on occasions one could not help but feel it as such.

The year 1918 has been an important one for the whole profession, and one of the most important items is the honour done to the serving branch, a branch which includes just now a very large proportion of the members on the Register. His Majesty may rest assured that we on our part shall do credit to the prefix and endeavour to act up to the gracious phrases in which the title "Royal" was granted.

THE USE OF ANÆSTHETICS AND THE ROYAL ARMY VETERINARY CORPS.

IT seems incredible to think that in this progressive age the use of anæsthetics for operation upon animals is not universal, and yet in the report of a British Veterinary Medical Association Meeting held

within the past few months one reads the following quotations " with regard to the question of local and general anæsthesia. Half of us use anæsthetics in their very very mildest form or only resort to occasional use." " I myself hate anæsthetics. I hate to use an anæsthetic, simply because it is a matter of which I am terribly afraid . . . " " It is wonderful how long a man can go through a practice without using anæsthetics either for a dog or any other animal." " We want more experience of their use and we have not, as far as I know, got a proper anæsthetic mixture that is without danger."

It is to be hoped that such statements will not be given credence by our Continental *confrères*, for if there is one branch of Veterinary Science in which the British Veterinary profession can legitimately claim the first place it is in the humane use of anæsthetics for operations upon animals. It is true that only so recently as twenty years ago the teaching of the proper administration and use of anæsthetics was neglected in our schools, and indeed it was then taught that, in so far as the dog was concerned it was impossible to administer chloroform with even a minimum degree of safety. To the horse, even, it was often given in a haphazard fashion and for other animals chloroform was considered impossible. To-day the general use of chloroform in the British Army Veterinary Service has become a by-word amongst our Continental *Confrères*, who envy the expert way in which any (even the youngest) veterinary officer will administer chloroform and anæsthetise his patient with the greatest *sang-froid* before he attempts to use the knife or commence the operation.

French and Italian veterinary surgeons have come long distances to our hospitals on many occasions in order to see our method of administering chloroform, and have openly expressed their admiration of its simplicity and safety. If the war has done no good in any other way it can at least claim to have extended this humane branch of veterinary science, and the R.A.V.C. certainly deserves much credit for the opportunities and encouragement it has always given in this direction.

When the time of demobilisation actually arrives a large number of veterinary officers who have " done their bit " for their country in their country's need will return to civilian life with the experience gained in this matter, and will unquestionably explain the confidence and knowledge they have gained in this direction to the benefit of the suffering animal and to their own credit—for no man who has become habituated to the use of chloroform for operations could ever possibly operate again without it, or its equivalent in the world of anæsthesia.

Original Communications.

NOTES ON AN OPERATION ON "QUITTOR" IN THE HORSE

By MAJOR BAGSHAW, R.A.V.C.
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I HAVE been asked to write down a short description of a method of operating on quittor in the horse which has met with considerable success in dealing with this condition as we find it in war-time. I do not claim that the operation is original, but I have not seen it described in the literature on the subject. This method was arrived at in the course of operating on over 1,000 quittors. Everyone who has had any considerable dealing with the condition knows that speaking accurately, every quittor needs dealing with on its merits; but the operation I am about to describe is one that can be approximately applied to the ordinary quittor with two or three sinuses above the coronary band.

I do not propose to discuss the ætiology, etc., of quittors, that has already been amply dealt with.

To commence with the operation.

Suppose, for the sake of example, we have a horse with a quittor on the outside of the near fore foot (the operation is the same whatever the position, the only difference being in the casting and fixing of the limb). The shoe is removed, the foot trimmed, the heel lowered, if not already low (an essential factor for good healing), the hair clipped off to the fetlock, and then the foot well washed with soap and warm water, washing all the sole and heel as carefully as the coronary surface. The animal is then cast on the off side, the near fore foot taken out of the hobble, a bandage put round the leg above the fetlock on both near fore and hind legs, and the near fore leg drawn back on to the near hind and tied into position (see illustration), and a tourniquet applied above the fetlock. The seat of operation is then washed and painted over with methylated spirit, which is lighted and allowed to burn for five to ten seconds. The "Foot Clamp" (see illustrations) is applied to the leg to keep the limb rigid and also to flatten out the pedal bursa, and render it less liable to accidental injury during operation. Chloroform is then administered.

After probing the sinuses to get an idea of their extent and direction, an incision is made above the coronet, over the anterior border of the cartilage (No. 1 in Diagram), removing an elliptical piece of skin about 1 to 1½ inches long and ¾ of an inch wide, varying with the size of the foot. Then a second incision is made in the heel on the posterior border of the cartilage (No 2 in diagram), removing another elliptical piece of skin from 1 to 2 inches long and about 1 inch wide.

The large size of these wounds is rather a factor for good, as one is able to work freely, and see easily, they heal rapidly.

French curved Hoof Knives are now used to remove the cartilage as follows :— Beginning at the heel incision, a "left curved" knife is passed "outside" the cartilage (between it and the skin and hoof), cutting downward and forward till the knife appears at the anterior wound. Then, working from the anterior wound, the "outside" dissection of the cartilage is continued backward and forward till it is quite free. Working again from the heel, and with a "Right curved" knife, the knife is passed from the outside of the cartilage up over the upper edge and down on the inside of the cartilage, care being taken to keep the point and edge close against the cartilage to avoid cutting the bursa. Still working from the heel the dissection is carried on forward and downward, till the cartilage is free on the inside also with a Hook ended hoof knife or a renette the anterior border of the cartilage is freed next, and it only remains to cut away the cartilage from its lower attachment, which is easily done, working from the inside and cutting outwards, and it comes away practically whole, leaving a long cavity in the foot, covered with a strong "bridge" of skin and tissue and "lit," if one may say so, by two windows.

At this stage a word of warning: I said the cartilage comes away "practically whole." There still remains a small portion in the pit in front of the wing of the Os Pedis, and this small piece is diseased in a large percentage of cases, and would, if left, lead to one of those annoying occurrences, which we all have known to our sorrow.

This piece is easily removed with a renette or a Volkman's Scoop, and then the whole cavity can be scrutinised for further sign of necrosis or loose tissue. This scrutinising is greatly facilitated by the use of a small electric torch about the size of a fountain pen, which can be put in at either "window" and the whole interior is plainly visible. All such necrosed or loose pieces should be removed and the wound cleansed. The chloroform muzzle is now removed. There only remains the dressing and bandaging. The choice of dressing is varied. Boracic Acid, Eusol or B.I.P. (Bismuth, Iodoform and Paraffin) all do excellently. The wound is packed with the selected dressing, care being taken that no solid material such as wool or gauze is put in.

A long piece of sterilised gauze is now taken and wound right round the coronet and heel, covering both the wounds, then a good sized pad of tow is applied over the seat of operation, padding the heel well to prevent chafing, and this is kept in position by means of a strong bandage which is carried well up the pastern.

The idea of applying the gauze as described is to prevent this tow pad working its way into either wound and so preventing closing.

Method of Fixing a Hind Limb for Operation on a Quittor on Outside of Heel.

Method of Fixing a Hind Limb for Operation on a Quittor Inside of Heel.

The whole is again covered with another bandage, the tourniquet removed and then the animal allowed to rise. There may be some slight hæmorrhage, which soon stops. The dressings are allowed to remain on 14 to 21 days with no further attention, except, perhaps to replace the outer bandages should they become displaced. During the time elapsing between operation and the removal of the dressing the horse's temperature should be taken daily, as occasionally one finds it going up somewhat alarmingly, when it becomes necessary to remove and reapply the bandages leaving the top pad *in situ*, the fever being induced by overtight bandaging, it is rarely necessary to remove the dressings themselves.

On finally removing the dressings, the foot is usually somewhat dirty, but when cleaned the cavity in the foot is found to be filled up and the two primary incisions reduced to about quarter of their original size and appearing as simple surface wounds, needing only ordinary dressings for about a week. The foot can be washed as soon as the bandages are taken off; the whole process to recovery should be completed in anything from 21 to 30 days.

The advantages claimed for this method are :—

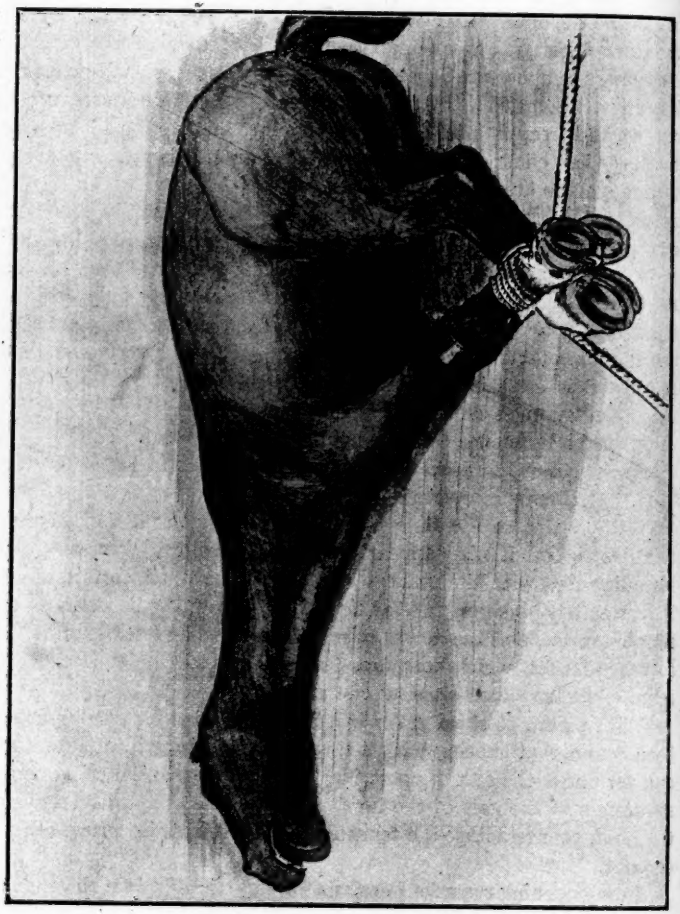
1. No interference with the hoof or coronary band.
2. Simplicity in after treatment.
3. Quickness in operation.

With regard to the time taken in operating, from the length of this description it may appear a somewhat lengthy process, but in actuality and with the practice and experience which fortunately or unfortunately one gets in War time, the whole thing becomes a very simple matter, and the actual operation can be completed in from five to ten minutes, which compares favourably with the time taken in some of the so called classical operations.

With regard to shoeing the foot after operation for quittor, it has been found that shoeing with a three-quarter shoe, with the deficient quarter under the seat of operation, has a very beneficial effect on the soundness of the gait of the horse and the subsequent good shape of the hoof, counteracting the tendency for hypertrophied growth of the coronet.

In my opening remarks I described this Article " Some Notes on an Operation for Quittor in the Horse." It must not be taken as applying also to the mule, as I found that our long-eared friends needed tackling in an entirely different manner, which I hope to describe at a later date.

For the casting and tying up of the animal I am indebted to Sergeant Smith, R.A.V.C., No. 9 Veterinary Hospital. For the illustrations to Private Harris, R.A.V.C., No. 9 Veterinary Hospital.



Method of Fixing a Forefoot for Operation.

SOME NOTES ON THE USE OF TARTAR EMETIC IN THE TREATMENT OF DOMESTIC ANIMALS AFFECTED WITH AFRICAN TRYPANOSOMIASIS.

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THE trypanocidal action of arsenic was known before the close of last century, but it was not until 1906 that Nicolle and Mesnil suggested that, on account of the chemical relationship of the metals, antimony compounds should be tried in the treatment of trypanosomiasis. The proposal was carried into successful practice by Plimmer and Thomson in their experiments of 1907. About the same time Mesil and Brimont arrived at the conclusion Tartar Emetic (either the Potassium or the Sodium compound) has a strong trypanocidal action, and is easily supported when given intravenously, though not when given subcutaneously. Van Saceghem and Nicolas (1916) demonstrated that it is the SbO group of Tartar Emetic which has the trypanocidal action, but that the conjunction of the tartaric acid radicle is useful in rendering the compound soluble in water and thus convenient to administer.

Subsequent to the initial experiments, many other preparations of Antimony have been tried, as has also the pure metal. The latter, finely divided and suspended in oil, can be given internally or used as a salve, but for some reason, probably connected with its high cost, it has been used little or not at all in the treatment of naturally infected domestic animals. Another preparation that in the hands of Kolle, Hartoch, Rothermundt and Schürmann (1913), and later in those of Yorke and Blacklock (1914), was found to have a high trypanocidal value, is Antimony Trioxide, well known under the name of "Trixidin" when it is in the form of a 30 per cent. suspension in olive oil. Unfortunately the high hopes of its becoming of great practical use, which experiments with laboratory animals raised, were not fulfilled when attempts were made to treat domestic animals. Being insoluble, the only safe way of injecting it is intramuscularly, but unfortunately that way is barred by the fact that, so administered, it generally causes severe and painful abscess-formation. It is true that Hoffman (1915) suggested that it can be safely administered intravenously when suspended in a syrup of sugar and gum-arabic, but so far no practical application has resulted.

Very soon after the high trypanocidal action and comparatively low toxicity of Tartar Emetic became known, the drug was tried on man and domestic animals; in fact prior to 1908 Broden and Rodhain had tried the effect of administering large doses to sleeping sickness natives. Literature on the subject has not been

XUM

readily accessible to me, but illustrative of the nature of the output are the following few abstracts:—Pecaud (1912) treated successfully eight cases of T. dimorphon (? congolense) infection of cattle by the administration of four or five doses of Tartar Emetic. Andrews (1912) used it successfully, though in conjunction with other drugs, in the treatment of experimental T. congolense infection of sheep; de Greef (1912) found it useless by itself in the treatment of T. cazalboni (vivax) in horses, although cures were effected when it was used in conjunction with Orpiment. On the other hand Mouchet and Dubois (1913) stated that T. cazalboni (vivax) is resistant to Arsenic but susceptible to Antimony; nevertheless they recommend joint use of the two. Rodhain and collaborators succeeded in keeping two dogs alive in thick "fly" by giving tartar emetic at critical times in the course of the infection. They found, also, that the drug in intravenous doses of 0·1 gm. generally succeeds in curing goats and sheep infected with T. cazalboni (vivax), but that a single injection given to mammals of the same species infected with T. congolense only caused disappearance of the parasites from the circulation for from 8 to 10 days. Jones (1915) showed how he successfully treated many cattle infected with T. pecorum (congolense), giving one or two injections of 1 to 2 gms. of Tartar Emetic, together with a course of Arsenious Acid by the mouth. Van Saceghem and Nicolas (1916) say that it is possible to cure bovines infected with T. cazalboni (vivax) by giving a single intramuscular injection of Tartar Emetic.

I have seen no records of the successful treatment of T. brucei infection of domestic animals in which Tartar Emetic played a part; in fact reports of cures by any means are so rare that one is justified in wondering if the 10 cases which responded to treatment in the hands of Webb (1915) were really infected with this most virulent species.

The trypanocidal action of Tartar Emetic can be observed both *in vitro* and *in vivo*. In some incomplete experiments, carried out with the object of ascertaining whether T. brucei could become Antimony-fast, I made hanging-drop preparations of one loop-full of blood containing parasites mixed with an equal amount of a 1-2000 isotonic saline solution of Tartar Emetic, and observed how long the parasites remained mobile. I tested several strains, including some from animals relapsed after a long course of treatment, but I did not find one of which all the individuals were not immobilised within five minutes. Tested in the same way against a 1-8000 solution, none was found mobile after ten minutes. As the amount of blood alone, to say nothing of lymph and serous fluids, in a horse or ox may weigh thirty kilos it is necessary, if the sole action of the drug

be a direct one, that it act in much greater dilutions than those mentioned above. Of course, while it undoubtedly has a direct poisonous effect on trypanosomes, it may also, according to Ciuca (1914. 1), have an indirect action by increasing the amount of complement in the blood. In whatever ways it acts it certainly kills all trypanosomes in circulating blood with remarkable celerity. To a donkey with blood rich in T. brucei I gave 60 c.cs. of a ½ per cent. sol., and 3½ hours later no parasites could be found in a preparation of fresh blood. To a mule I gave 70 c.cs. of a similar solution and obtained the same result. To another mule I gave 70 c.cs. of a 1 per cent. solution and half an hour later could find no parasites on a stained film. To another mule, similarly affected with T. brucei, I gave 70 c.cs. of a 2 per cent. sol., and after half an hour, and again after 6, 18 and 24 hours, I made fresh and stained preparations, all of which were negative.

That trypanosomes do become Antimony-fast was demonstrated by Mesnil and Brimont in the case of T. evansi, but it is doubtful if the African trypanosomes become immune to Antimony as readily as they do to Arsenic.

Tartar Emetic is very soluble in water, and it is the simple aqueous solution that is generally employed by veterinarians. In human practice, for the treatment of sleeping sickness and leishmaniosis, the drug is generally given intravenously in the form of a 2 per cent. solution rendered isotonic by the addition of salt (Rogers, Sinton), or it is given intramuscularly combined with carbolic acid, glycerine, sod. bicarb. and distilled water (Castellani).

If a watery solution is injected subcutaneously, it causes intense necrosis, which may remain sterile until the destroyed tissue is absorbed and replaced or may become infected and a large abscess result. Hence, when injecting the drug intravenously, we must be very careful to prevent any of it escaping into the surrounding tissues. For this reason I prefer to use a 4 per cent. solution to one weaker, as thereby the time of operation during which the patient's struggles may displace the needle is reduced. Van Saceghem and Nicolas (1916) recommend that Tartar Emetic be given in the form of a suspension of 1 gm. of the drug in 50 c.cs. of Olive oil, to which after sterilisation is added 10-20 per cent. of Camphor, dissolved in a little ether. I may state here that I gave this preparation a fair trial, administering it subcutaneously to a horse, intravenously to six mules and asses, and intramuscularly to seven equines. No ill result followed the intravenous injections; nor, on the other hand, was the benefit derived therefrom greater than that given by a simple aqueous solution. The subcutaneous injection caused the formation of a large abscess. The intramuscular injection in one case gave rise

to a slowly-maturing, deep-seated abscess; in the others it produced a slightly tender temporary swelling, causing slight stiffness and high carriage of the affected quarter for a few days. Dissection of the site of injection in a donkey, which died four days after such an intramuscular injection, showed considerable necrosis of muscular tissue, but no abscess formation or deposition of recognisable drug. The therapeutic results which I obtained, as will be shown later, warrant a further trial of this method of administration, but were not good enough for me to go back on my opinion that a 4 per cent. watery solution, given intravenously, is the best form in which to administer Tartar Emetic.

Intravenous and intramuscular injections can be given to equines with extreme ease, and, assisted only by natives, one can give fifty intravenous, or double that number of intramuscular, injections in an hour. In the case of cattle the thickness of the skin makes it advisable to incise it before inserting the needle. Difficulty of restraint makes it necessary, too, to cast a bovine before attempting to give an intravenous injection, although intramuscular ones can be given to a standing beast. Rogers (1917) says that the maximum dose required to destroy all the parasites of Kala Azar in the human subject when given every day for two or three months is approximately 1 c.cs. of a 2 per cent. sol. for every 10 lb. body weight, with a maximum of 10 c.cs. for Europeans in good condition and 7 c.cs. for Indians. He says, further, that the maximum dose should only be reached very gradually, and, to commence with, the dose should not exceed half or a third of the maximum. Large doses of the drug are said to cause cardiac depression, and, in the human subject, may be followed by considerable temperature reaction. Ciuca (1914-2) finds that solutions stronger than 1 in 1000 produce slight hæmolysis both *in vivo* and *in vitro;* also that the blood of treated animals coagulates slower than normal. Putting the weight of a horse or native ox at a maximum of 900 lb., then, if the toxicity of the drug be the same for them as for man, the maximum dose ought not to exceed 60 c.cs. of a 2 per cent. solution every third day. Experience teaches that this amount is just about the maximum one can give with safety at such short intervals Not that to any but an exceptional animal can one afford the time to give twenty to thirty intravenous injections within three months; much fewer doses at infrequent intervals are all that a Government veterinary surgeon can give to even horses and valuable cattle, while if he cannot cure range or native-owned animals with two or three injections they must go uncured To our inability to give a systematic course of injections may be laid the blame of some of the failures that attend attempts at treatment.

A safe single dose for horse, mule, ox and even donkey is 1 gm., and 0·1 gm. for sheep and goats. Strangely enough on those rare occasions when these doses prove toxic, the susceptible individuals are not necessarily small ones; a big half-bred ox or a horse is as likely to show unfavourable symptoms as the result of injection of the usually safe dose as is a native heifer or a mule. A donkey, it is true, will not tolerate the same stiff course of treatment that a mule will stand, but their greater susceptibility does not affect the truth of the rule. One gm., then, given to one of the larger species does not affect it unfavourably in any way; neither temperature, pulse nor appetite are altered. I have frequently interrupted a horse's feed to give it an injection, after which it has continued eating as though nothing had happened. This dose, too, can be repeated safely every fifth day for an indefinite period of weeks and even months. I have frequently administered 2 gms. as a single injection without untoward results, yet I have known 70 c.cs. of a ½ per cent. sol. cause a horse to reel and fall. I have given a horse 70 c.cs. of a 2 per cent. sol. on three successive days without producing toxic symptoms, but another died as the result of the same treatment. To one donkey I gave safely two doses of 70 c.cs. of 2 per cent. sol. with a day's interval between, but another donkey died after receiving during the same period two doses of only 50 c.cs. each. The toxic effect of Antimony appears to be cumulative to that of Arsenic, so that on one occasion the administration of 25 c.cs. of a 4 per cent. sol. of Tartar Emetic to a mule which had been previously heavily dosed with white arsenic was followed immediately by a fatal attack of colic and superpurgation. The following course of treatment caused the deaths of three horses, although many others withstood a severer one:—1st day, 70 c.cs. 2 per cent. Tartar Emetic; 3rd day, repeat the injection; 5th day, 7 grains Sod. Arsenite in 70 c.cs. water, intravenously; 9th day, repeat the emetic injection. I may state here that the dose of Sod. Arsenite is a safe single one.

When the toxic symptoms are those of vertigo, they are manifested almost directly after completion of the operation. The animal staggers and falls, or it may rear up and come over backwards. It lies for a time taking deep, slow, irregular inspirations, and the pulse is almost imperceptible. As a rule the animal recovers completely within an hour or two; when death is the result it follows speedily the onset of symptoms. The cumulative toxic effect of the drug is generally revealed by different degrees of colic, varying from mere uneasiness to the severest manifestations of abdominal pain, accompanied by sweating, blowing, cyanosed mucous membranes, and rapid, weak pulse. There may be salivation, purging and, rarely, attempts at vomiting. The severe attacks generally terminate in death.

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I regret that my earliest notes on the subject of treatment are lost, so to a certain extent I must trust to my memory for a compendium of what they contained, endeavouring to be accurate in essentials, though obliged to substitute round figures for exact ones.

A routine course of treatment for cattle infected with trypanosomiasis, devised by, I know not who, used in 1912 by H. L. Jones, brought to my notice in 1913 by the then acting C.V.S. of Northern Rhodesia, is intravenous injection of 1 gm. of Tartar Emetic followed by a course of nine powders of arsenious acid; three of 1 gm., then three of 1·5 gm., and then three of 2 gms., administration being on alternate days. Jones, who published them in 1915, claimed excellent results as the effect of two complete or modified courses given to cattle infected with T. congolense not far from Beira. In August, 1913, 600 grade cattle *en route* to the south passed through a thick fly-belt near Serenje, in Northern Rhodesia. Three months later I examined the 450 survivors. Of these 50 presented the appearance typical of fly-struck animals; they were emaciated, weak, with harsh coat showing some depilation, pale mucous membranes, accelerated pulse, thin blood. I examined the blood of half-a-dozen of the worst but only in one did I find the trypanosomes (T. congolense). Their appearance was in marked contrast to that of the remainder of the herd, and I believe that all or nearly all were genuinely fly-struck. As the result of a single course of the above treatment, more than 40 recovered so completely that, six months later, they crossed the Zambesi River as healthy cattle.

During 1914, I treated several small lots, aggregating 100 head, of fly-struck cattle in the vicinity of Fort Jameson, Northern Rhodesia. The results obtained were conflicting.

On a farm lying thirty miles S.W. of the township, there occurred one of those small outbreaks, mechanically spread by flies other than tsetse, that frequently arise when a tsetse-struck beast is introduced into a healthy herd. Twelve animals were affected, and I demonstrated the presence of T. congolense in seven. Treatment consisted of an injection of 50 c.cs. 2 per cent. Tartar Emetic, followed by nine arsenious acid powders, and then by a second injection. This herd was under my observation for three years afterwards, so I am able to state that at least 8 of the 12 made complete recoveries. A half-bred bull, with positive blood and very weak at the time of treatment, begat many calves the following year, and a half-bred cow, which also had positive blood, has since added two calves to the herd. On a neighbouring farm, a single course of treatment cured three quarter-bred oxen affected with T. congolense. On yet another farm, also lying to the west; I cured 6 out of 12 oxen.

Meanwhile, however, I was obtaining very inferior results on farms lying north of the township. In this area there are more hæmatopota and tabassus (two genera of flies capable of mechanically transmitting trypanosomes) than there are on the farms where success attended treatment, so relapses cannot be distinguished from reinfections; nevertheless, I do not think that this accounts for my almost complete failure to effect cures there. The course of the disease was often checked sufficiently to allow treated oxen to do work of which otherwise they would have been incapable.

Not that palliative effects alone justify treatment on farms. There is the danger of keeping alive reservoirs to serve as foci for fresh outbreaks of the mechanically transmitted disease. On farms where there are many healthy cattle, all fly-struck ones which are not absolutely cured should be destroyed. Circumstances alter cases, and there are times and occasions when the mere prolongation of an animal's working life justifies a course of treatment, but the menace hinted at above should always be borne in mind.

The drudgery of weighing out arsenic powders, which I dared not relegate to a black servant, caused me to inquire into the relative values of the tartar emetic injection and the course of white arsenic powders. I found that while heavy doses of the latter drug will clear the circulation temporarily, it is almost, if not quite impossible, to effect a cure with white arsenic alone; the host is poisoned more readily than the parasite. On the other hand, I cured three (100 per cent.) half-bred Aberdeen Angus cattle with two or three injections of Tartar Emetic alone.

When, early in 1915, I proceeded with a mobile column towards the northern border of Rhodesia, I was reasonably hopeful that I should be able to save at least some oxen of the fifteen spans (20 to a span) that hauled the wagons through the 100 miles of "fly" that lie south of Kasama—the place where, on November 14th, 1918, the last of the German forces in East Africa laid down its arms—a redoubtable force under a very brave commander. While passing through the belt I had given the oxen daily doses of about 10 grains of white arsenic. When I commenced the course of attempted curative treatment, not more than half the animals were showing pronounced symptoms a point I thought distinctly in my favour. To each beast I administered 60 c.cs. of 2 per cent. sol. of Tartar Emetic, and some received, in addition, a course of arsenic powders. Every beast relapsed, and it was interesting to note that, although prior to injection it was only the exceptional animals which showed trypanosomes in their blood, yet, after relapse, parasites were readily demonstrable in the circulating blood of almost every beast. Mixed T.

congolense and T. vivax, with the former predominating, was the type of infection. I repeated the injection again and again, but I do not think I effected a single cure.

During the latter months of 1915 I had occasion to again travel with wagons and oxen, this time through the strip of Portuguese East Africa that lies west of Nyasaland. As we had to travel over 300 miles after passing through the first fly-belt, the mere prolongation of the working-life of the fly-struck oxen justified an attempt at treatment. My method was to watch the spans and as soon as any ox was noticed to be merely carrying his yoke, instead of pulling, I took his temperature and examined his blood. Was there fever or were parasites (generally T. congolense, rarely T. vivax) demonstrated. I promptly injected him, with the result that even the next day he would be pulling better. When we had completed our journey I picked out 100 animals as being probably fly-struck. I injected them and repeated the dose after a fortnight. Six months later 75 of these took the road again and repeated the long journey.

During 1916 I travelled through some light "fly" in North Nyasaland. A few oxen of a herd of beef animals intended for our E.A.Forces were struck. I took the opportunity of injecting half a dozen and keeping them under observation for a month. Referring to notes taken at the time I find the following to be typical :—

May 14th, 1916 Quarter-bred ox, formerly in good condition ; has been falling off for several days. All bodily functions normal. Ev. temp. 104°. Mucous membranes pale. Blood count 4,000,000 per c.c. Gland juice and blood both contain few sluggish tryps. When stained these were seen to be T. congolense. Gave 60 c.cs. of 2 per cent. sol. of Tartar Emetic intravenously.

May 24th 1916. Repeated injection.

June 24th, 1916. Condition greatly improved. Blood-ve and count 5,800,000.

In the latter months of the same year I treated a few more cases near Fort Jameson, obtaining results similar to those of 1914. As I still have notes taken at the time I extract the following as an example of a successful instance :—

July 27th, 1916. Quarter-bred ox ; good cond. but commencing to go off. Slight sternal œdema. Pale mucous membranes. Blood thin and fresh preparation shows a few T. congolense. Gave 60 c.cs. 2 per cent. Tartar Emetic intravenously.

Aug. 8th, 1916. Animal stronger. Mucous membranes pinker. Blood

less watery and negative. Gave 75 c.cs. 2 per cent. Tartar Emetic.

Nov. 14th, 1916. Has been working steadily for three months.

Jan. 18th, 1917. In good condition.

About the same time I gave a single injection to a few cattle infected with T. vivax. Sufficiently good results were obtained to confirm the opinion which I had previously formed, and which is that of several other investigators, that this species is at least as susceptible to Tartar Emetic as is the smaller, commoner T. congolense. One instance :—

July 25th, 1916 Quarter-bred ox. Poor condition. Blood contains few T. vivax. Gave 60 c.cs. of a 2 per cent. solution of Tartar Emetic.

Jan 18th, 1917 Blood negative. Condition fair.

This completes the account of my efforts to cure bovine trypanosomiasis. Unsuccessful as were my labours they are to be counted as rich in achievement when compared with the complete failure that attended my efforts to cure equine trypanosomiasis.

During 1917 and 1918 I treated more than 200 horses and mules, also a few asses. I have notes of 140 cases, in 55 of which the causal parasites were identified. Most of the animals were struck in the southern parts of what was German East Africa. I set out the relative frequency with which the different species of trypanosomes were found :—

	No. of Cases	T. brucei	T. congolense	T. vivax	Mixed T.b. & T.c.	Mixed T.v.&T.c.
Horses	18	17	1	—	—	—
Mules	26	19	2	1	3	1
Asses	11	6	2		3	
	—	—	—	—	—	—
	55	42	5	1	6	1

It is more than likely that some of the cases classified as harbouring T. brucei also contained T. vivax, because it is impossible in a case of mixed infection to distinguish between some T. vivax and some of the long forms of T. brucei. The rule, however, holds good, that T. brucei is the parasite most commonly found in, and most virulent for, flystruck equines in East Africa.

My original attempts at treatment were directed towards two ends ; Prophylaxis and cure. When I failed to achieve either I fell back on a third, Palliation.

Prophylaxis.—Attempts at immunisation have led to no practical results, nor is it possible by means of external applications to ward off the attacks of tsetse flies. For the present, if it is necessary to

send animals into " fly," and especially under the conditions of active service, all one can do is to drug them in the same way as one takes large prophylactic doses of quinine to ward off malaria. Arsenious acid has been largely used to this end, and whatever its palliative effects have been, its prophylactic action has been found to be nil. The action of Tartar Emetic given intravenously cannot be expected to protect for more than a few hours; although, could one inject animals every evening, it is possible that all trypanosomes inoculated during the day would be killed by the evening injection. My experiments directed towards the elucidation of this point are incomplete, and in any case, unless the animals are expectedto be in " fly " but a very short time, it is impracticable to give frequent administrations; the veterinary officer attached to a mounted unit will not get the opportunity of giving daily injections. I tried, on a small scale, the effect of giving a weekly injection to animals operating in " fly." I entered such country on Oct. 6th and I was off and on in thick " fly " until the 30th. The experiment ceased on Nov. 20th. Between Oct. 6th and Oct. 12th dozens of tsetse fed daily on the animals, so that none could escape inoculation. I had with me two horses and four mules. One mule served as control; the remaining animals were injected with 25 c.cs. of a 4 per cent. sol. of Tartar Emetic on Oct. 13th, 21st, 27th and Nov. 1st, 6th and 11th. Such dosing in no way incapacitated them for work on those days.

Horse No. 1 showed signs of " fly " on Oct. 19th and four days after the third injection there were T. brucei in the blood. These disappeared as the result of the fourth injection, but were again present on Nov. 20th. Although he carried his rider up to the end of October and was still serviceable when the experiment ended, his condition was only a little better than would have been that of most untreated horses.

Horse No. 2 showed T. brucei five days after the first injection, four days after the second and five days after the third. Nevertheless he carried his rider stoutly up to his death, which was from colic a few days before the experiment ended.

Mule No. 1 showed a high temperature on Oct. 21st. This subsided after injection and thereafter it pulled splendidly and showed no more fever up to the day of its discharge.

Mule No. 2 pulled weakly on Oct. 22nd, recovered, relapsed on Nov. 1st, when its blood was positive, then ran a nearly normal temperature for a fortnight. On Nov. 20th its temperature was high but to all appearance it was as fit and strong as on the day it was first infected.

Mule No. 3 showed parasites in its blood on Oct. 26th.—returned to

a normal condition, had one day's fever and positive blood on Nov. 1st, then ran a normal temperature up to the 15th. At the conclusion of the experiment it showed no outward signs of the disease and was working daily.

The control mule pulled well, with odd days of slackness, up to Oct. 28th. Its blood had not been examined before, but on that date it swarmed with T. brucei. Thenceforward to the end of the experiment its blood remained positive and its temperature chart, showing continuous high, remittent fever, presents a marked contrast to those of the treated mules.

The experiment shows that until some better method is made known it is worth while injecting mules every five days while they are in "fly." It will not prevent them contracting infection but it will check fever and conserve energy. It is, however, palliative, not prophylactic.

A more rational line of prophylactic treatment is the intramuscular injection of a trypanocidal drug which, absorbed slowly, will keep the circulating blood unreceptive for trypanosomes. I tried Trixidin, but the local reaction lamed the horse so that he could not proceed into "fly." Then I tried the intramuscular injection of a camphorated oily suspension of Tartar Emetic, as recommended by Van Saceghem and Nicolas. I injected the drug deeply into the gluteal muscles and, simultaneously, gave an injection of one drop of injective blood below the skin of the neck. To a donkey I gave 50 c.cs. of a 2 per cent. suspension; to a horse and a mule I gave 70 c.cs. Simultaneously they received blood rich in T. brucei and T. congolense. In no case did T. congolense subsequently appear in the circulation, but T. brucei were found 15 days later in the donkey and 13 days after injection in the horse and mule. Another donkey which received 50 c.cs. of the suspension and a drop of blood rich in T. brucei only, showed trypanosomes six days later.

On account of the inflammation and necrosis that are caused by intramuscular injections this form of administration cannot be repeated frequently. I intend to try it on cattle, but I do not feel inclined to use it again on equines.

Attempts to cure equine trypanosomiasis: Owing to the comparative rarity with which I have had opportunities of attempting to treat equines affected with unmixed T. congolense or T. vivax my notes on the subject are scanty.

A donkey infected with T. congolense received an intravenous injection of 30 c.cs. of a 2 per cent. Tartar Emetic solution. Trypanosomes were present 13 days later.

Another donkey received a single intravenous injection of 50 c.cs.

of camphorated oily 2 per cent. suspension of Tartar Emetic, and parasites reappeared 16 days afterwards.

A mule infected with both T. congolense and T. vivax relapsed to both species after receiving three intravenous injections of oily suspension of Tartar Emetic at intervals of a week, each injection being 60 c.cs.containing 1·5 gms.

A mule infected with pure T. congolense recovered incompletely as the result of the undermentioned course of intravenous injections :—

Jan. 2nd. 60 c.cs. 2 per cent. Tartar Emetic.
5th. 10 grs. Sod. arsenite in 70 c.cs. water.
7th. 10 c.cs. 2 per cent. Tartar Emetic.
9th. 10 grs. Sod. arsenite in 70 c.cs. water.
28th. 7 grs. Sod. arsenite in 70 c.cs. water.
30th. 7 grs. Sod. arsenite in 70 c.cs. water.
May 20th. Good working condition, though slight intermittent fever indicates tolerance of trypanosomes rather than sterilisation.
Aug. 30th. Has been working steadily for two months. I may record here that the above course of Sodium arsenite injections is practically a toxic one for most equines.

The mule infected with T. vivax and T. congolense, which relapsed after three injections of Tartar Emetic suspension, recovered when it had received the following treatment :—

Jan. 11th. 4 gms. Atoxyl in 50 c.cs. water subcutaneously.
15th. 70 c.cs. 2 per cent. Tartar Emetic intravenously and 15 c.cs. 20 per cent. Atoxyl subcutaneously.
17th. 70 c.cs. 2 per cent. Tartar Emetic intravenously and 15 c.cs. 20 per cent. Atoxyl subcutaneously.
19th. 7 grs. Sod. arsenite in 70 c.cs. water intravenously.
25th. 7 grs. Sod. arsenite in 70 c.cs. water.
30th. 7 grs. Sod. arsenite in 70 c.cs. water.
Feb. 5th. 70 c.cs. 2 per cent. Tartar Emetic intravenously and 3 grs. Sod. arsenite in 30 c.cs. water, also intravenously.
May 30th. Good cond. Normal temp. chart. Discharged as cured.

In an attempt to cure T. brucei infection of mules I gave the following to 100 infected animals :—

1st day 60 c.cs. 2 per cent. Tartar Emetic intravenously.
4th ,, 7 grs. Sod. arsenite in 70 c.cs. water intravenously.
7th ,, Repeated Tartar Emetic.
10th ,, ,, Sod. arsenite.
14th ,, ,, Tartar Emetic.
17th ,, ,, Sod. arsenite.
21st ,, ,, Tartar Emetic.

24th day Repeated Sod Arsenite.
28th „ „ Tartar Emetic.

Not a single cure resulted.

It would be wearisome were I to attempt to set down particulars of the forty cases of T. brucei infection which received individual attention ; or the variations of doses, intervals, methods of administration and combinations with other drugs. Out of the mass of data, which includes yards of charts, there stands out one significant fact. Alone or combined with other drugs there is no known method by which Tartar Emetic can be used to effect the cure of equines infected with T. brucei.

In parenthesis I may state that, among other drugs, I have tried the effects of Formalin, Ammonium bichromate, Quinine, Optochinin, Orpiment, Trixidin and Trypanosan.

Not absolutely every case of T. brucei infection has ended fatally. I have records of three mules which after a month's treatment did not relapse for more than two months, and then only thermally, their blood being negative even when tested by inoculation of 50 c.cs. into a susceptible animal. Capable of work they became and apparently tolerant of trypanosomes ; yet such a result, obtained in 3 animals out of 140, in no way modifies the rule that T. brucei infection of equines is still incurable.

Conclusions.

On account of its solubility, low toxicity and high trypanocidal action, Tartar Emetic is probably the most valuable drug available for use on a large scale in the treatment of domestic animals affected with trypanosomiasis. Its cheapness is also a point in its favour.

It can be administered intramuscularly or intravenously, but the latter method is the better.

One gramme every third day is the maximum that can be administered over a long period to even the largest domestic animals, but the same amount every fifth day is well tolerated by adult bovines and equines.

Administered *secundun artem* it is capable of effecting cures in domestic animals infected with certain strains of T. vivax and T. congolense. On the other hand, one frequently encounters resistant strains of the same parasites.

Nevertheless, were it possible to give the patient a course of injections extending over a long period, I believe that most cases of disease due to these two species of trypanosomes could be cured. Sometimes a single injection will bring about this result.

Tartar Emetic shares with all other known drugs the property of being useless in the curative treatment of T. brucei infection of equines.

Its sole value in connection with that form of trypanosomiasis is palliative, when given regularly to animals working in "fly."

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TUMOUR IN THE DUODENUM OF A SIX YEAR OLD COW.

By E. MORGAN, M.R.C.V.S., D.V.H.,
Puerto Cabello, Venezuela.

ONE morning I was consulted by telephone regarding a cow which, according to the version of the man in charge, had symptoms of colic.

The cow appeared in normal health until the previous evening, when she was seen to mount another cow and to fall down sideways to the ground, and after a lapse of a few seconds managed to get on her feet again, and followed the other cows to the potrero (field), but was trembling and depressed looking. The next morning, when the cows were brought to the yard, this particular cow showed symptoms of colic. They gave her 1 lb. of Glauber's Salts. I was unable to go and see the animal until the following morning, *i.e.* the third day. I found the animal on the floor in a posture which is rather unusual for a cow to place herself in. She had the fore legs extended forwards, and lay herself flat on the floor of the abdominal wall, very similar to the mode of resting adopted by a ewe which is heavy in lamb and has twins in the uterus, or similar to the posture of a hare, when she squats in her form, so as to evade the eyes of her pursuer.

After a while she would change into a normal posture, then spasms would come on, when again she would soon go back to the squatting hare's position. In spite of forcing or straining herself so much, hardly anything was voided except an insignificant quantity of almost liquid faecal matter and gas. The abdomen was not abnormally distended, and by percussing the flank, the animal being a soft skinned and rather lean one, and by manipulating, I could feel that the intestines were empty, and on pressing very hard towards the pyloric end of the stomach the cow showed evidence of pain. The animal had an anxious look; Ears ice cold; horns slightly cold; rectal temperature normal. She would not take any solid food, but sometimes would sip a little water. She would not get up on her feet, and kept bellowing out each time she was forced to try and get up. Eventually a dog was thrown in front of her, when she immediately got up with ease, and walked round the yard quite freely.

The history of the case would suggest to one's mind that the cow had injured or ruptured some important part internally. Anyone who has seen "Gut-tie" or "Pelvic hernia" in bullocks, would here witness many of the typical train of symptoms.

The owner would insist on saying that it was merely a case of colic, and nothing more, and that another dose of stronger purgative medicine would remove the cause, as probably they had spilt a large portion of the salts on the ground.

I told him that I was afraid a drastic dose would only aggravate matters, as I thought there was something worse than hard faecal matter obstructing either the gastro or intestinal passage. Also that most probably it was either in or near the stomach; that it might be intussusception of the bowel or some foreign substance lodged at the pyloric opening of the stomach. I had to bear in mind the class of food these cows were feeding on at the time, viz., some coarse fibrous thick grass, which during certain months of the year resembles shrubs more than grass. Also they were fed on the thick stems of banana plants, which sometimes measure nine inches to a foot in diameter and are considered of a high milk-producing value and, which the cattle relish very much. They slice them up to the cattle like turnips; the fibre is coarser than that of turnips and harder to digest, but very sappy. As it was late in the evening I complied with the owner's request to give her another dose of medicine, which consisted of Ol lini, Ol crotonis, Hydrarg subchlor *Vide*, Wallis Hoare's "Therapeutics." The following day the owner advised me that the cow was slightly worse, inasmuch as that the spasms occurred oftener. I told him that if he wished, I was prepared to go out the following morning, and as a last resource to operate on the cow. I had already distinctly told him that I would not prescribe any more medicine for the cow. He acceded to this proposition and I decided to perform rumenotomy. We went to the farm, but instead of an operation I was obliged to perform a post-mortem examination, as the cow had died about half an hour previous to our arrival.

Post-mortem:—I found the intestines empty from the rectum up to within about ten inches from the stomach, where I noticed a distension to about six times its normal size, which on manipulation proved to be a hard fibrous growth inside the lumen of the duodenum, and at one place, about four inches from the pyloric opening of the stomach was completely obstructing the passage, and its apex was coming to a point which was softer than the rest of the tumour. The greater portion of the tumour was confined to an area about six inches in length and originating from the side of the lumen or intestinal wall, but there was a fibrous thickening extending backwards for several inches along the wall of the intestine. The contents of the stomach appeared soft. I have seen far larger quantities of ingesta in stomachs of healthy animals killed at the Abattoir than in this stomach. Probably the contents of the stomach were able to pass until a few days previously.

The custom in most parts of Venezuela is to allow the calves to suck the cows until within a month or two of calving time, therefore it was difficult to know whether there had been a gradual or a sudden diminution in the milk yield. The mucous membrane of the intestine was slightly inflamed throughout its length. All the other internal organs appeared healthy.

Remarks: — This proves that when diagnosing a case one must not rely too much on the history given by owners and others. This case was rather misleading if one was going to base the diagnosis on circumstantial evidence of the witnesses. This cow appeared healthy until the time that she was seen mounting the other cow. We also know that only robust cows as a rule perform these prankish feats. Yet in spite of all this, since the first time I saw the cow, the case conjured up in my mind the bullocks with "Gut-tie" owing to similarity of symptoms.

By carefully watching a case of an animal in pain, one is able very often to glean some knowledge regarding the position or situation of the cause of such pain. Undoubtedly this animal managed to ease the pain to a certain extent by adopting this peculiar posture, which in a healthy animal we might call abnormal. Again, the spasms would recur immediately she placed herself in the normal posture then she would go back to the posture of the squatting hare. No better example can be given than an animal resting on the diseased side of the chest, so as to give the healthy lung more freedom of expansion. Many other illustrations are seen in everyday practice, such as a horse suffering from lung trouble which always tries to catch as much fresh air as possible by turning its dilated nostrils towards the door of the loose-box. So by watching animals in health and disease we find that "every picture tells a story," which is of great value or aid for us to diagnose the case.

With animal patients we have to practise ourselves to note all these observations to a degree. Except in the case of young children, the practitioner of human medicine need not pay such particular attention to these details in order to diagnose the case. Everybody knows that diagnosis is far more difficult with our cases than with human patients. I notice that one famous veterinary surgeon quotes Cicero, who said that "Art is born of the observation and investigation of Nature."

CONJUNCTIVITIS AND COLLYRIA.

By G. MAYALL, M.R.C.V.S.,
Bolton.

CONJUNCTIVITIS of the catarrhal form is very common in dogs. It seems to be more frequent amongst them when they live in damp industrial regions than when they pass their lives in the purer air of

country districts. In towns we seem to notice its greater frequency in dogs of small stature, such as Scottish terriers, Yorkshire terriers, bull dogs, fox terriers, etc., than in bigger dogs (*i.e.* dogs whose eyes are situated at a higher level from the ground), such as greyhounds, St. Bernards, mastiffs, retrievers, etc. The instances of bronchitis and catarrh in dogs too seem to be more frequent in the smaller breeds of dogs than the larger ones. It has often seemed to us that one strong reason for this is the exposure of the eyes to a greater amount of bad vapours and contaminated air at a low level from the ground. The currents of cold air are stronger and keener close to the ground, the lower air strata are more heavily charged with dust, sand and irritant gases than those higher up and both lungs and eyes in small-statured dogs are in a more favourable position to receive the fullest dose of any injurious influences so they become most frequently affected.

Apart from catarrhal conditions of the conjunctiva associated with distemper, eczema of the eyelids, mange, etc., we get many cases of what appear to be uncomplicated and simple catarrhal conjunctivitis. Frequently these subjects recover after a varying period, but now and then we get some frightfully obstinate cases to deal with. Fortunately the majority of dog clients are of the class that used to keep carriage horses in days gone by, or of the better middle class, and as a rule they are reasonable, can afford to pay, do not expect lightning results, but are willing to leave dogs with us until cure or marked benefit results. The slowness of progress of a case however frequently dissatisfies the veterinary surgeon. One day he comes round his dog cases and finds a patient with a clearish eye and conjunctiva and the next it is filled with catarrhal discharge as profuse as when the original treatment of the dog began. The keeping of the dog's abode clean and free from draught has been strictly observed, but the disease still varies in its exacerbations and tests all the skill and knowledge of the veterinarian to defeat it. We have kept note of some half-dozen cases we have recently treated, and think the periods of time occupied in cure and a statement of the collyria used may be interesting. The worst case as regards trouble and duration of treatment was in a Scottish terrier. Here the period taken up in treatment was eight weeks and the collyria used were boric acid, grs. xx, zinc sulph. gr. I, water an ounce, and later on peroxide of hydrogen solution and 5per cent. protargol solution. The lotions were applied by means of a syringe two or three times daily. A bull dog and a Pekinese took three weeks to cure with lotions of boric acid and zinc sulph. and adrenalin and alum lotion (5 grs. to the ounce of water) and protargol solution respectively.

A second Scottish terrier in a bad way from conjunctivitis, mange and oral sepsis was cured by means of scaling the teeth, cleaning the

mouth with powdered charcoal, the administration of Parrish's chemical food and treatment of the conjunctivitis with 1 in 5,000 increased in strength to 1 in 4,000 corrosive sublimate solution applied warm twice daily. The conjunctivitis here was cured in ten days, and although very formidable at first the result was gratifying. A fifth dog, an Airedale, operated on under quinine and urea hydrochloride injections and chloroform anaesthesia for a large post-pharyngeal abscess was also suffering badly from catarrhal conjunctivitis which was cured in a week with corrosive sublimate collyria. A word of caution must be given in the use of this collyrium; if much of it moistens the eyelids externally it seems to denude them of hair, and it is wise to smear vaseline on the lids externally to protect them from the action of the lotion.

A sixth dog, a black Spaniel, took well over three weeks to set right with boric lotion and argyrol.

The results of these few cases seem to show that the quickest and most satisfactory results can be secured with corrosive sublimate lotions and we intend in future to use them largely. Where there are corneal ulcers or opacities they seem to have a beneficial effect on these complications,

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INTERESTING CLINICAL CASES.

By HENRY B. EVE, M.R.C.V.S.
Folkestone.

SPLIT AITCHES IN THE COW.

Subject.—A fat cow about five years old, property of a well-known big cattle dealer in Kent.

History.—The animal had been purchased in the Shires and put on rail in a cattle-truck with others by the S.E.C.R. for its destination, Ashford. On arrival it was found down in the truck unable to rise, and evidently seriously injured, and I was 'phoned to attend. Jan. 23rd, 1919. A £45 animal.

Symptoms.—On arrival at the station I found the cow lying down on the floor, with both hind legs out at right angles to the body, sweating and blowing hard, temperature elevated (104½), and evidently in great pain; pulse quick (90). Conjunctiva visibly injected. On examination I found that the animal was insensible to pin-pricks in the region of the back, and on manual examination, per vagina, I discovered that the articular head of the femur could be distinctly felt in the "Obturator Foramen." When an assistant "abducted" the left limb it moved easily, and it could be carried upwards almost vertical to the spine, but not so the right one. After making a further exploration (rectal), I came to the conclusion that I had a case of

fracture of the pelvis to deal with, and I informed the owner that it was advisable to kill at once, as, in my opinion, she had "split her aitches." "I was afraid so," he replied. A butcher was sent for at once, and I advised a P.M.

P.M.—Fracture of the Symphysis Pubis and a lot of bloody stuff in the meat below the aitch-bones.

Remarks.—She made a fine carcase of beef, dressed. I presume the accident occurred through slipping in the truck during shunting operations. The only references to this accident that I can find are in Mr. Henry Thompson's (Aspatria) Vet. Lectures. It is apparently not noticed by writers on cattle pathology (Dobson and Steel) or general surgery, as far as I know.

Cases have also been recorded by Mr. W. R. Davis, M.R.C.V.S., of Enfield.

YOHIMBINE IN THE TREATMENT OF INCONTINENCE OF URINE IN THE DOG.

Subject.—Fox-terrier about three years old, which had suffered from incontinence of urine since recovering from a bad attack of distemper, and had been treated by himself, being a doggy man, a perfect know-all, and informed me "vets." in his experience were no good at dog ailments. He told me (which was quite unnecessary) that it was a very nervous animal. I had my doubts which was worse, owner or dog.

Symptoms.—No fever or pain present upon palpation of abdomen or loins; animal did not resent interference at all. The urine obtained by catheterisation gave no clue to inflammation in the urinary organs, nor in other respects could I detect any appearance of organic disease. The animal's demeanour, however, was very noteworthy—no animosity, ferocity or spirit present, as usually encountered, but very *shy and timid.* Owner informed me urination occurred, only too frequently without any straining or *pain,* and was involuntarily passed. Generally only small quantities of a clear fluid were passed. Increased thirst was *not* observed.

Diagnosis.—Paralysis of the bladder.

Prognosis.—Doubtful; wait and see.

Treatment.—Admitted patient to infirmary for observation. Dosed for worms; no result. Gave Aphrodine orally, two tablets twice daily, and after a week's treatment (six tablets) noticed improvement had set in, and diuresis, frequent, had ceased. Reduced dose to one tablet a day, as dog became excited and restless, after which excitement disappeared, spontaneous urination ceased, and apparently recovery took place. Discharged from infirmary.

Diet.—Raw meat, tripe, Glaxo, and barley water.

Remarks.—Having used Yohimbine extensively and successfully as an aphrodisiac, I thought I would experiment and try it, after failure with *Damiana Ext., Coca, Nux Vomica* and *Pure Ovo-Lecithin.* The Yohimbine proved as effective as possible, and I advised owner to use him for stud purposes, which he has done, and has a strong litter of pups, with patient apparently cured, there being no return of the trouble.

PSOROSPERMOSIS, OR RABBIT DISEASE.

THIS disease in wild rabbits, which eat wet green food, is a very fatal one. It is known as psorospermosis, and is a liver disease, like "fluke" in sheep. The malady in the tame rabbit seems to me to be a disease of domestication, and assumes the form of a toxæmia, or toxic enteritis, similar to the white diarrhœa of fowls. Now, confinement, overcrowding, bad food, and especially soiled litter invite disease, whilst an impure water supply and malhygienic conditions bring it about.

Forms.—Acute (intestinal; very fatal); chronic (hepatic). The former chiefly occurs in young rabbits, the latter affects older ones.

Symptoms.—If any are shown before death, subjects appear generally unthrifty and coats are staring; pot-bellied; visible mucosæ pale, rapid emaciation and diarrhœa present in many cases; also thirst, in different appetite or loss of it entirely. In older rabbits there is often no diagnostic symptom beyond moping.

Treatment—Preventive.—Remove all apparently healthy subjects to fresh quarters and isolate from those obviously affected. Boil the water supply and give medicine internally in the water as recommended for fowl cholera (zinc sulpho. carb. compound). Burn all excreta disinfect the hutches, and afterwards spray them inside and out.

Diet.—Give sour milk and bran, crushed oats, dry concentrated food and hay, and occasionally dandelion leaves chopped up with feed, and see that the troughs for feeding are out of reach for defecating into, to prevent contamination of food. The troughs are to be periodically washed with germicidal soap (McClintock's) 2 per cent.

Curative.—Kill and cremate all obviously affected hopeless cases, also burn the litter, etc. Segregate all to be treated and give zinc sulpho carb., ferri carb. sac. and powdered gentian in food. See that the food given is not contaminated in administering and is kept separate from that supplied to diseased subjects.

Remarks.—The cause of tame rabbits becoming affected to mys mind suggests that infection is probably introduced into the rabbitrie by owners collecting food from plantations and other places where wild rabbits have existed and defecated. The next opportunity I have, I intend to try the effect of Gignoux male fern ethereal extract as recommended for the treatment of distomatosis.

Abstracts.

VITAMINES AND NUTRITION.*

By PIERRE A. FISH,
Ithaca, New York.

THE importance of little things in science has grown as research has increased. Only thirty or forty years ago it was not uncommon to hear and read of the Germ Theory of Disease. It is now an obsolete expression, but we are still in the shadow as regards ultra-visible germs.

The animal organism is extremely sensitive to certain substances in minute quantities. A striking example is that furnished by the suprarenal glands. Their removal is attended with fatal results. The active constituent of these glands—adrenalin or epinephrin—is present, under normal conditions, only to the extent of one part in 100,000,000 parts of the blood, and yet this in finitesimal trace is essential to life.

Research has shown that life cannot be maintained on an absolutely pure mixture of protein, carbohydrate, fat, and salts. Comparatively recent evidence has shown that, in order to maintain the organism in condition, a small quantity of something not heretofore recognised must be present in the food. A ration, however well balanced and however well organised as to its calorific or fuel value, is still deficient if this " something " is wanting.

Very many foods contain an exceedingly small but important amount of accessory substances, which have recently been shown to be essential for the growth, development, and well being of the organism. When these substances are excluded from the food, the body suffers, and sooner or later becomes subject to various diseases. What these substances are and the rôle they play in the chemical changes of the body is the subject of considerable discussion and investigation. Various substances have been isolated whose presence in foods influences favourably the condition of the body and whose absence produces the opposite effect.

Among these substances or " accessory foods " are vitamines. The term vitamine was suggested by Casimir Funk in 1911. It is made up from the word vita (life) and amine, meaning an amine or chemical compound essential to life.

The disease known as beri-beri, a polyneuritis, was one of the first to be associated with the investigation of vitamines. This affection has been prevalent in those instances where the diet was exclusively or principally upon polished rice. It was found that

* Read before the Veterinary Medical Association of New Jersey, semi-annual meeting, Asbury Park, New Jersey, and published in the *Journal of the A.V.M.A.*

a similar condition of polyneuritis with the same diet could be induced in pigeons and fowls, and these forms served usefully for experimental purposes. If unpolished rice (with husk) was used the disease did not occur, or if polished rice were fed and some of the husk or polishings later administered, health was maintained.

Funk has endeavoured to isolate the substance (vitamine) which prevents beri-beri. From 100 kilograms of dry yeast he prepared 1·6 grammes of a crystalline substance which, if given in doses of 4–8 milligrams to neuritic pigeons, effected a rapid cure in two or three hours.

Scurvy is another disease which occurs in man and certain higher animals when the diet does not contain fresh vegetables or fresh animal foods. Formerly epidemics of scurvy broke out on sailing vessels when the crew was forced to live for several months on such food as canned beef and dried cereals. During the siege of Paris in 1871 an epidemic of scurvy broke out in a portion of the population because of the lack of fresh food. This conception of the cause of scurvy is supported by the fact that a corresponding change of diet and especially the administration of fresh milk or lemon juice leads to a rapid recovery of most cases affected by the disease. It is reasonable therefore, to conclude that there exist in fresh food some substances which are essential for the prevention of scurvy and may be designated as anti-scurvy or anti-scorbutic substances. These substances, as already intimated, have no direct relation to the other known constituents such as proteins, carbohydrates, fats, and salts.

From the practical point of view it is highly desirable to know something of the distribution of vitamines in the various natural foods. A quantitative method for estimating the vitamine-content of a given food unfortunately is not available at the present time. A relative estimate, however, is useful, and this information is available in the following table as to antineuritic and antiscorbutic properties :—

Antineuritic Properties.		Antiscorbutic Properties.	
Relatively Rich.	*Relatively Poor.*	*Relatively Rich.*	*Relatively Poor.*
Brewer's yeast.	Sterilized milk.	Fresh vegetables.	Dried vegetables
Egg yolk.	Sterilized meat.	Fresh fruits.	Dried fruits.
Ox heart.	Cabbage.	Raw milk.	Sterilized milk.
Milk (fresh).	Turnips.	Raw meat.	Canned meat.
Beef and other fresh meats.	Carrots and other vegetables of this type.	Cereals, sprouting.	Dried cereals.
Fish.	Highly milled cereals.		Pork fat.
Beans.	Starch.		Starch.
Peas.	Molasses.		Molasses.
Oats	Corn syrup.		Corn syrup.
Barley.			
Wheat.			
Corn.			
Other cereals.			

It is an unfortunate fact that some of the foods richest in vitamines are more costly than those in which they are relatively poor. This is unfortunate, especially in the large cities where in the poor districts at certain seasons fresh eggs, fresh milk, beef, etc., are practically prohibitive financially. Much of the disease and malnutrition in these areas is doubtless due to the lack of these food accessories.

Although the presence in certain foods of unknown accessory food components has been pretty well established, it is a matter of considerable importance to determine their chemical nature and physiological action. Experiments have shown that the antiscorbutic and antineuritic substances could be extracted from certain foods by water. The antineuritic substances have also been found to be soluble in alcohol; as already mentioned in connection with yeast, this substance has been obtained in crystalline form, which yields on analysis carbon, hydrogen, nitrogen, and oxygen. Although our knowledge of the chemical nature and physiological action of vitamines is still far from complete, a fact of fundamental importance is that they are fairly susceptible to temperatures above 100° C. (boiling temperature). Prolonged heating of most of the natural foods to a temperature of 120° for one to three hours will destroy most of the physiological activity of the vitamines originally present in these foods.

On the physiological side, the evidence seems to indicate that without vitamines the food induces a toxic reaction more or less gradual in its effect; the best remedy for which is the antidotal action of the vitamines. The animal body is not capable of manufacturing the antidote or the known vitamines from vitamine-free food. (Antitoxins originate within the body; vitamines originate outside the body.) All of the higher animals, including man, receive their vitamine supply directly or indirectly from plants. It is the plant that synthesises the vitamine, and we obtain our necessary vitamine supply either by eating vegetable food or animal food. Cows store in their bodies the vitamines which they consume in their fodder; a portion of them is secreted with the milk, supplying the calf with the necessary vitamines as well as furnishing a valuable source of vitamine for man. Pullets transfer part of the vitamine content of their cereal food into the eggs they lay. *It is the plant which keeps up the vitamine supply essential for animal life.* The wonderful synthetic power of plants is shown by their capacity of building up the vitamine from simple inorganic compounds. The fate of the vitamines in the animal body is not very well known. The body seems to have the capacity of holding fast to them for some little time. If a diet sufficient in vitamines is changed to one

deficient or free of vitamine, it takes, as a rule, several weeks or even months before obvious and well-defined symptoms of deficiency diseases appear.

As already remarked, the animal organism is very sensitive to certain substances as exemplified by adrenalin, an animal product. Evidence seems to be growing that the animal organism is also very sensitive to a vegetable product, the vitamines, and that we have therefore from vegetable sources, products which are just as essential for life and the well-being of an animal as are the hormones or internal secretions.

With continued research it is not impossible that vitamines may be isolated to such an extent that they may be used to supplement a diet in which they are deficient, or utilised in a therapeutic way in deficiency diseases for curative purposes.

The effect of the war upon the health and food supply of a people may be sensed from the newspaper reports of conditions in the areas occupied by the Central Powers. Of specific conditions information is vague. With unbalanced, scanty rations, with vitamine content ignored, deficiency diseases may be expected. Of these scurvy and beri-beri are best known, pellagra may be partially concerned and possibly rickets. Scurvy appeared in Glasgow and the English midland cities in 1916–17, when there was a scarcity of potatoes. Beri-beri was prevalent for a time during the siege of Kut, when the white troops were on a ration of white flour. This disappeared when replaced by coarsely-milled barley flour and Indian cereal grains. Scurvy broke out among the Indian troops in Mesopotamia, as they did not eat the meat and horse-flesh ration which protected the white troops from this disease. Substitution of fats deficient in the fat accessory for butter and diminution in the quantity of fat ration has caused outbreaks of xerophthalmia among children in the enemy countries, and the increased amount of carbohydrates in the diet to make good the shortage in protein and fats has caused diminution in the growth of young children.

The health and food question is of vital importance to America, as to other countries. The mistakes and experiences of others should be duly considered and profited by. It is not always necessary that the full picture of a deficiency disease should make its appearance. Such vague symptoms as loss of appetite and general weakness might very well, in some instances, be due to a deficient diet. It is quite possible that a number of indefinite complaints and symptoms of adults and children may be due to this cause, and would be benefited by the administration of vitamines. The scientific and practical problems of stock-raising will probably be very greatly benefited by

researches on the effect of vitamines on the growth of animals and the composition and nutritive value of cows' milk. Efforts should be made to make use of certain industrial wastes rich in vitamines such as brewers' yeast, rice polishings, etc.

It is an unfortunate coincidence that foods deficient in vitamines, which as a rule contain large amounts of or are exclusively carbohydrates, are cheap and abundant. The rising cost of foodstuffs induces the poorer classes, who cannot ration themselves intelligently, to ration themselves according to prices and to unconsciously put themselves on a low plane of vitamine intake.

To the veterinarian the nutrition of animals is as important as the nutrition of the human to the physician. Although the domesticated animals are doubtless less susceptible than the human to so wide a range of deficiency diseases because of less interference with the natural ration in the way of cooking, etc., it is well to remember that a perfectly balanced ration of pure proximate principles or a ration properly constructed as to its calorific or fuel value is not sufficient to sustain life satisfactorily if the vitamine content is deficient. It has been reported that certain prepared foods have caused digestive disturbances. It is reasonable to infer that, as in human nutrition, vitamines must be considered. When research has advanced sufficiently it is not unlikely that it will be shown that dietetics play quite as important a part as therapeutics in safeguarding animal health.

It has been said that "Each country and each epoch has its own food problems." It is our duty to assist in the solution of them.

ADRIAN V. HALL, commenting on antiseptics in *The American Journal of Veterinary Medicine* for May, 1918, shows how Dakin's solution is a variation of Labarraque's solution, which was famous in 1835. The difference between the two products is as follows:—

Dakin's Solution.—400 grammes of washing soda dissolved in 10 litres of tap water, to which 200 grammes of chloride of lime is added. Shake the mixture, allow to settle, filter and add 40 grams of boric acid.

Labarraque's Solution.—12 ounces of chloride of lime rubbed in water. Stand 24 hours, decant and strain; add 20 ounces of washing soda dissolved in warm water, and make up to 1 gallon with water.

Labarraque's solution is a splendid disinfectant for stables and kennels; it removes dirt and grease from everything and cleans up as it goes.

Dakin's solution is an improvement on Labarraque's solution, as it does not irritate the skin and tissues. Glycerine, if added to

Labarraque's solution in the proportion of 1 ounce to a pint is valuable, and 2 ounces of sugar to each pint makes dressings non-adherent to lacerated and denuded surfaces.

A fine improved solution first produced by Dr. Charles Naylor is made by adding 100 parts of chloride of lime to 2,000 parts of water, decanting, and straining, and adding 190 parts of Epsom salts. This solution anæsthetises inflamed parts, and promotes regular granulations. It does not harden the skin of the hands, and dressings are easily removed when water is applied. Lacerated wounds cleansed daily with it and afterwards treated with some simple healing oil on the packs do wonderfully well. G. M.

Personal.

CONGRATULATIONS to Mr. J. Ewing Johnston, M.R.C.V.S., of Belfast, on the M.B.E. recently bestowed in recognition of his services in connection with remount and other duties during the war.

MR. FRANCIS EVELYN PLACE, B.Sc., M.R.C.V.S., who is well known in India and Australia as a lecturer in veterinary and agricultural science, and who formerly practised at Honiton, Devonshire, is suffering from a fractured hip and is at present in hospital at Adelaide, South Australia. His friends in the profession will wish him a speedy and permanent recovery.

Report.

REPORT OF THE CHIEF VETERINARY SURGON FOR SOUTHERN RHODESIA (ABRIDGED).

AFRICAN COAST FEVER.—*Salisbury District.*—No cases of disease occurred on the four farms regarded as infected at the beginning of the year. A fresh outbreak occurred on the farm Waterfall, 8 miles from Salisbury on the Charter road. Short interval dipping was at once instituted and the farm fenced with commendable despatch. Notwithstanding these measures, and also short interval dipping on adjoining farms, the disease appeared on two of the latter several months afterwards.

Mazoe District.—No cases occurred during the year, and all restrictions were removed, except from the fenced and cattle-free farm on which the disease occurred the previous year.

Mrewa District.—In February a slight extension of infection occurred in the Mangwendi Reserve; 1 beast died and the remainder of the herd, 17 head, was destroyed.

Melsetter District.—At the beginning of the new year there were 24 infected farms. During the first quarter 39 head died on 6 of these, since when there has been no case of Coast Fever in the district. Reference must, however, be made to a reported suspected case on the farm Helvetia in May; unfortunately the films prepared for microscopic examination were unsuitable, but taking all the circumstances into consideration, there is good reason for believing that it was not a case of Coast Fever.

Umtali District.—A fresh outbreak occurred on the farm Engwa, in the southern part of the district. The degree of infection was most intense—out of 149 head involved only 37 remain. There is no doubt that this outbreak was the result of a movement of cattle, under somewhat peculiar circumstances, from the southern part of Melsette district two years previously, and that the existence of infection during this period was masked by the use of a dipping tank. Fortunately the infected area was in a very isolated position, and no extension of infection took place.

Gwelo District.—No extension of infection occurred, and on the two infected farms a slight mortality occurred during the earlier months of the year.

Victoria District.—After over 11 years' freedom from disease, an outbreak occurred on the farm Lounton, situated in an isolated position, away from any main road or path, and over 100 miles from the nearest centre of infection. Shortly afterwards infection was discovered amongst cattle on three immediately adjoining farms, and, after a lapse of several months, on two farms within a few miles and on the Victoria Commonage, about 25 miles distant.

General.—The number of fresh outbreaks during the year was 13, with a mortality of 438 head, as compared with 20 and 382 respectively for the previous year.

Short interval dipping is one of the most effective methods at our disposal of dealing with Coast Fever. "No ticks, no Coast Fever" is axiomatic, but under local conditions the former state is impossible of achievement. The complete eradication of infection is possible, however. It has been eradicated from many districts in Rhodesia and the Union, and it can be eradicated from those in which it at present exists. I have no hesitation in saying that if every area carrying infected ticks could be accurately defined, the disease would be eradicated within a period of two years by our prseent methods. It may well be asked why these areas cannot be so defined and dealt with. The reply is, to my mind, very simple. In the majority of cases the disease has been in existence for several months (two years in the Engwa case) before it is brought to our notice. Meantime

infection has been disseminated, which may and frequently does not manifest itself for another extended period, and so the cycle goes on, with the result that we are generally at the heels of the disease instead of in front of it. In dealing with the outbreaks, the known infected areas are a comparatively simple proposition; the unknown and unsuspected we cannot combat. To remedy this state of affairs, universal compulsory effective dipping of cattle throughout the territory has been proposed. Whilst the value of the proper use of the dipping tanks is fully recognised, it may be stated as a fact, and not as a matter of opinion, that weekly dipping, however effectively practised, will neither eradicate Coast Fever nor prevent its spread. It is true that as ticks are reduced in numbers by dipping and the chance of the disease being propagated and disseminated is correspondingly lessened; at the same time, dipping may mask infection for an indefinite period and result in recrudescences on areas where it had been regarded as a thing of the past, and in fresh outbreaks on previously clean areas. This point of view is clearly and concisely expressed in the Supplementary Report of the African Coast Fever Committee as follows:—"Such dippingi may prevent any noticeable number of deaths when Coast Fever exsts, yet cattle moved from such areas may and have been the cause of carrying the infection with them."

These remarks are not to be taken as reflecting any doubt in the writer's mind as to the value of dipping as a general prophylactic measure; they are simply intended to forestall the disappointment which is bound to result if a scheme of universal compulsory dipping at seven day intervals is relied upon for the eradication of Coast Fever.

QUARTER-EVIL.—The mortality from this disease, which began in November, 1916, persisted throughout the year, in Matabeleland a total of 133 deaths being reported.

ANTHRAX.—Three outbreaks occurred on farms in the Mazoe and Salisbury districts. The diseased carcases were cremated and the in-contact animals, 615 head, vaccinated. The total mortality was 9 head.

TUBERCULOSIS.—Although no case of the disease came under the observation of the Department, several head of Rhodesian cattle shewed tuberculosis lesions on *post-mortem* inspection at the Johannesburg abattoirs.

CONTAGIOUS ABORTION.—The existence of infection was diagnosed in four herds. Unfortunately there is no satisfactory method of treatment capable of adaptation to local circumstances, but, as far as possible, infected animals are isolated, the aborted fetuses destroyed, and the farm or area involved placed in quarantine for an extended period.

FLUKE DISEASE OF CATTLE.—This affection appears to be increasing. During the drought, a heavy mortality occurred in various districts. A few animals were treated with *Extractum liquidum filicis*, B.P., with most promising results. Owing to shortage of staff and the difficulty of obtaining this material, the observations could not be carried on; they will, however, be resumed when conditions are more favourable.

HORSE SICKNESS.—The total mortality reported was 107 head, mostly horses. As most of the mules in the country and a considerable number of horses have been immunised, and as many horses possess a certain degree of resistance from several years' exposure to infection, this mortality indicates a very heavy infection during the season.

SHEEP DISEASES.—Very few cases of blue tongue occurred, and these were of a mild nature. A slight mortality, less than 3 per cent., occurred on one farm in the Melsetter district.

RINDERPEST.—Early in the year reports were received from Veterinary Officer Hooper-Sharpe, attached to General Northey's Column in East Africa, that as a result of the many movements of cattle caused by the military operations, rinderpest infection was spreading towards the border of Northern Rhodesia. Full reports of the excellent work done by this officer, under the most trying and difficult conditions, have already been submitted. The magnitude of the work of dealing with rinderpest in such a large area, and the menace to the whole of South Africa by the southward spread of infection, were realised by all the Administrations concerned, and Mr. C. E. Gray, Principal Veterinary Officer of the Union, was appointed Commissioner in charge of operations, and proceeded to East Africa with a staff of veterinary surgeons and complete equipment. The latest reports show that satisfactory progress has been made in combating the disease, and that there has been no further extension southward.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Reviews.

VETERINARY AND COMPARATIVE OPHTHALMOLOGY. By Dr. Eugène Nicolas, M.V. (Alfort), M.D. Veterinary Major of the 1st Class, Member of the Central Society of Veterinary Medicine, Paris. Translated, edited and enlarged by Henry Gray, M.R.C.V.S. Pp. 575, with 15 coloured and monochrome plates and 225 figures in the text. Price 15s. net. Publishers: Messrs. H. and W. Brown, 20, Fulham Road, London, S.W.

MR. HENRY GRAY has done good service to the Veterinary profession by translating this standard work by the eminent French

veterinarian into English. The translator has done his part well, and added to the value of the book by inserting in the text many of his own experiences in the domain of ophthalmology. Professor Macqueen and Major-General Fred Smith have read through the proofs and made valuable suggestions and additions, and the volume is dedicated by the translator to the memory of his friend the late William Hunting, F.R.C.V.S.

In sixteen chapters the various structures, diseases and injuries of the eye and its appendages and the therapeutics and surgery of the eye are discussed, reviewed and explained, and at the end of the text there is a note on the French regulations concerning eye affections. The chapter on cataract is exhaustive and very interesting and instructive. We seldom get any records of operations for cataract in our professional literature and there would seem to be a rather large field open for enthusiastic and clever operators, especially in canine circles, in this connection. Not the least useful chapter to the everyday practitioner is that on ocular therapeutics and formulary. Very many apt eye applications are given, and those who have had obstinate eye cases to deal with will surely find something in the fine list presented that will benefit the condition, providing the action of the remedy chosen is closely observed.

Puzzling affections of the eye which the general practitioner now and then encounters are those due to tuberculosis, epithelioma and sarcoma. The conditions are irremediable except by prompt surgery (and not always then) and a correct diagnosis in such cases is desirable and important. One or two illustrations of these lesions are very acceptable and will help the veterinary surgeon to recognise the affections when he sees them. There are few things that are missed in the book and it is quite up to date and thorough in its teachings and explanations. Its science is good and the application of science well described. Refined and ready remedial measures are given in a varied and profuse manner, and if at times we miss such primitive though useful procedure as that of removing chaft or oatflights from the eye by means of Venice turpentine, yet other ways necessitating a bit more trouble, but quite effective and more impressive to the looker on, are indicated. We know of only one other book in the English language dealing with veterinary ophthalmology, and the one under review should be welcomed by the profession and tend to enlarge its field of vision and scope of knowledge. The printing and binding of the book are first class and its handiness as a very valuable work of reference is quite clear. G. M.

MATERIA MEDICA AND THERAPEUTICS. By J. Mitchell Bruce, M.A., LL.D., M.D., F.R.C.P., and Walter J. Dilling, M.B., Ch.B. [Eleventh edition. Revised to correspond with the War Amendments of July, 1917 and March, 1918. Price 9s. net. Pp. 648. Published by Cassell and Co. La Belle Sauvage. London, E.C.4.

This is a fine little book. The fact that it has gone into its 11th edition is testimony enough as to its utility and value to the practitioner of human medicine. A War Emergency Formulary gives full information with regard to the temporary substitutes which are at present being largely used in place of substances which have been withdrawn from the Pharmacopæia, *e.g.*, certain fats, sugar and glycerine. Chapters on electrical treatment, massage and exercises, and antiseptics and surgical dressings make the little manual quite modern, and notice of some 40 new remedies proves that the authors have been wide awake in keeping up to date. The work is divided into three chief parts, dealing with the Inorganic Materia Medica, the Vegetable and Animal Materia Medica, and Synthetic Preparations and General Therapeutics. The plan of the manual enables one to trace the physiological actions and uses of drugs passing through the body and the actions and uses of remedies are discussed under the physiological systems of the body, thus conducting a student from facts with which he is familiar to the great principles of treatment. One of the tests as to usefulness through which a volume of this description may be put is to look up in it all the preparations that may be found on the shelves of a fairly-well equipped pharmacy or surgery. We guarantee that if this is done there will be found few sins of omission. In every way the book is a success; this issue will circulate quite as freely as its predecessors; it is a standard work of its kind, distinguished by lucidity, conciseness, and breadth of vision. The publishers have done their share in first-class style. G. M.

NOTICES.

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